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COSTS AND RETURNS OF PRODUCING MILK IN THE UNITED STATES—1979, 1980, AND PRELIMINARY 1981

PREPARED BY THE

ECONOMIC RESEARCH SERVICE
U.S. DEPARTMENT OF AGRICULTURE

FOR THE

COMMITTEE ON AGRICULTURE,
NUTRITION, AND FORESTRY
UNITED STATES SENATE

JULY 1982

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FOREWORD

"Costs and Returns of Producing Milk in the United States—1979, 1980, and Preliminary 1981," is a continuation of the annual reports on the costs of producing milk first published in 1976.

The information in this and other cost of production reports is intended to provide economic information for use in planning by both producers and agribusiness firms. It should also be useful to those who are involved in farm and food policy determinations.

JESSE HELMS,
Chairman.

LETTER OF TRANSMITTAL

DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D.C.

Hon. JESSE HELMS,
Chairman, Committee on Agriculture, Nutrition, and Forestry,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: The enclosed report, "Costs and Returns of Producing Milk in the United States—1979, 1980, and Preliminary 1981," is the sixth in a series of annual reports presenting information on the cost of producing milk in the United States. These reports are prepared by the Department of Agriculture under mandate of the Agriculture and Consumer Protection Act of 1973 (Public Law 93–86).

Sincerely,

JOHN R. BLOCK,
Secretary.

Enclosure.

PREFACE

This is the sixth annual report on the cost of producing milk in the United States. The Agriculture and Consumer Protection Act of 1973 directed the Secretary of Agriculture to estimate the annual costs of producing certain major commodities, including milk. To implement the legislation, a program of research on agricultural costs of production is carried out by the National Economics Division (NED) of the Economic Research Service (ERS), U.S. Department of Agriculture (USDA). ERS began a program of estimating milk production costs in 1974 and continues to estimate these costs annually. Earlier cost of production reports resulting from this work are listed at the end of this report.

Estimates of the 1979, 1980, and 1981 costs and returns are presented in this report. The data on which these estimates are based came from a variety of sources, but the primary source is a 1980 survey of dairy farmers; in previous reports, a 1975 survey of dairy farmers was the primary source. When analysis shifted to the 1980 survey data, the original 24 dairy production regions, consisting of one or more States, were dropped. State boundaries became the basis for the new survey, and dairy farmers in 19 major dairy States plus New England were interviewed. The data are aggregated in this report to make regional and U.S. estimates. All data and information are processed, evaluated, and updated using the firm enterprise data system (FEDS) operated by ERS and Oklahoma State University at Stillwater, Okla.

This report was prepared by the staff of NED's Economic Indicators and Statistics Branch and Animal Products Branch. Principal contributors were George Frick, G. Bradley Cilley, Richard Fallert, Ronald Krenz, and Gail Garst. Cilley prepared the enumerative farm data and constructed the 420 FEDS budgets used in the analysis.

SUMMARY

Direct costs plus ownership costs for the dairy enterprise averaged $13 per hundredweight of milk in the United States in 1981, compared with $12.20 in 1980, and $10.61 in 1979. These estimates are based primarily on a 1980 survey of 2,095 dairy farmers in 19 States and New England, representing 85 percent of U.S. milk production and 84 percent of U.S. milk cows.

Direct costs (such as feed costs, milk hauling, fuel, and hired labor) were $9.28 per hundredweight in 1981, up from $8.83 in 1980 and $7.79 in 1979. Ownership costs (replacement reserve, interest on borrowed and equity capital, taxes, and insurance for machinery, buildings, equipment, and livestock) were $3.72 per hundredweight in 1981, a rise of 35 cents (10.4 percent) following a rise of 55 cents (19.5 percent) in 1980. Feed costs, the largest component of costs, were $6.36 per hundredweight in 1981, an increase of 4 percent from 1980 and 18 percent from 1979.

Revenue from fluid milk sales accounted for about 90 percent of dairy enterprise revenue during the 1979–81 period while sales of cull cows, calves, and dairy replacements contributed the remaining 10 percent. Dairy enterprise revenue averaged $14.97 per hundredweight in 1981, up from $14.33 in 1980 and $13.42 in 1979. Revenue above direct costs was $5.69 per hundredweight in 1981 compared with $5.50 in 1980 and $5.63 in 1979. Revenue above direct costs in 1981 on a per cow basis averaged $772.83, or about $62,000 for an 80-cow herd—the average herd size for farmers interviewed in 1980 to obtain data for this study. Returns to operator, family labor, and management (total dairy enterprise revenue less direct and ownership costs) averaged $1.97 per hundredweight in 1981 compared with $2.13 in 1980 and $2.81 in 1979. These returns averaged $267 per cow in 1981, or $21,360 for an 80-cow herd.

There are substantial differences in dairy enterprise revenues and costs in each region (tables 2–4). The Southern Plains region received the highest total revenue over the 1979–81 period while the Pacific region received the lowest revenue. Total direct and ownership costs tended to be lowest in the Pacific region and highest in the Appalachian region. Total net returns to operator, family labor, and management were highest in the Upper Midwest and Northeast regions, and lowest in the Appalachian and Corn Belt regions.

During the 1979–81 period, about 28 percent of total direct and ownership costs were ownership costs; livestock costs accounted for 52 percent of ownership costs. When high returns are anticipated over time, they usually are capitalized into the cost of the factors of production. Dairy cow prices rose from under $500 per head in early 1977 to a peak of $1,230 on a national average basis in November 1980.

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INTRODUCTION

This study provides national and regional estimates of the weighted average costs and returns of producing milk in the United States in 1979, 1980, and 1981. Production costs vary widely over time, from one farm to another, and from one State or region to another. Variability among farms is due to many factors—differences in production per cow, climate, management skills of individual producers, herd size, and the prices paid for feed, labor, and other inputs. Some operators achieve efficiencies through more intensive use of resources, especially buildings and equipment. Thus, while the costs and returns shown here are average estimates, the range of costs and returns that they encompass is broad.

For the initial dairy cost of production analyses, a survey of dairy farms was conducted in 1975, collecting costs and farm structure data for 1974. This information provided the basis for the reports published from 1976 to 1980. Over time, many cost and quantity items become outdated and do not accurately reflect changing technological and structural conditions on dairy farms. Therefore, a new survey of 2,095 dairy farms in 19 States plus New England was completed in the spring of 1980, representing 85 percent of the total U.S. milk production and 84 percent of the milk cows (figure 1 and appendix table 3). The information obtained from the cooperating dairy farmers was specifically chosen to complement agricultural prices, production inputs, and production outputs that are regularly surveyed and published by the Crop Reporting Board, Statistical Reporting Service (SRS), USDA. The new data base provided by this survey results in slightly higher costs than those associated with the original 1974 base data.

Figure 1

Production Subregions for Milk Cost Analysis

Indicates States within indicated regions where dairy farmers were interviewed.

NATIONAL AND REGIONAL COSTS AND RETURNS OF PRODUCING MILK

Gross dairy enterprise revenue (milk sales and revenue from sales of cull cows, calves, and replacements) by farmers averaged $14.97 per hundredweight in 1981, up 4.5 percent from the 1980 returns of $14.33 and 11.5 percent from $13.42 in 1979 (tables 1–4). After accounting for direct (cash) costs of $9.28 in 1981, dairy farmers received a return of $5.69 per hundredweight. This compared with returns above direct costs of $5.50 in 1980, and $5.63 in 1979. After accounting for both direct costs and ownership costs (replacement reserve for machinery, buildings, equipment, and livestock; interest on borrowed and equity capital; taxes; and insurance), dairy enterprise returns received by farmers averaged $1.97 per hundredweight in 1981 compared with $2.13 in 1980 and $2.81 in 1979.

The percentage increases in costs per cow are considerably higher than costs per hundredweight. This is due to the increases in milk production per cow, estimated at 2.3 percent between 1980 and 1981 and 3.1 percent between 1979 and 1980. The survey found that milk production per cow on surveyed farms averaged 12,907 pounds for 1979. The 1980 and 1981 production levels of 13,312 and 13,617 pounds were obtained by using the relative year-to-year changes which are reported in Crop Reporting Board publications.

DIRECT COSTS

Direct costs include feed, milk hauling, milk marketing, artificial insemination, veterinary and medicine, dairy supplies, dairy herd improvement fees, livestock hauling, fuels and electricity, machinery and equipment repairs, hired labor, interest on operating capital, and overhead. Direct costs accounted for 71 percent of total direct and ownership costs in 1981, compared with 72 percent in 1980 and 73 percent in 1979. Direct costs, at $9.28 per hundredweight, were up 45 cents (5.1 percent) in 1981 from 1980. Direct costs per cow were $1,264.92 in 1981, up $92.18 (7.9 percent) from 1980 following a rise of $165.32 (16.4 percent) in 1980.

Feed costs

Total feed costs per cow were $866.84 in 1981. Feed costs accounted for the largest percentage of direct costs throughout the 3-year period discussed—69 percent in each of the 3 years. The cost of concentrates (grains and commercially mixed feeds) fed per cow rose by $55.27 from 1979 to 1980, and another $29.54 from 1980 to 1981. Most of this change is associated with an increase in concentrates fed per cow. Concentrate costs made up about 55 percent of total feed costs during the 3-year period. Concentrate costs per hundredweight of milk produced rose from $3.02 to $3.35 to $3.49 during the 1979–81 period. The average cost of forage per cow—which includes corn silage, hay, haylage, pasture, and miscellaneous forages—rose from $305.50 in 1979 to $369.43 in 1980 and $391.69 in 1981. These costs represent a 21-percent increase between 1979 and 1980 and a 6-percent increase between 1980 and 1981.

Average milk production in 1979 was reported by surveyed farmers at 12,907 pounds per cow and feed concentrate intake at 5,824 pounds, a ratio of 45 pounds of concentrate per 100 pounds of milk. In 1980, milk production per cow increased to 13,312 pounds per year and concentrates fed rose to 5,991 pounds, a ratio of 45 pounds per hundredweight of milk, the same as a year earlier. The estimates for 1981 were 13,617 pounds of milk and 5,898 pounds of concentrates, with a ratio of 43 pounds per hundredweight. The individual regions vary considerably from these weighted averages, both in milk production levels and grain feeding ratios.

The quantity of commercially mixed concentrate feeds accounted for 42 percent of total concentrates fed in 1979, 37 percent in 1980, and 38 percent in 1981. Published prices of commercial feeds were used in estimating costs.

Labor

Hired labor costs of 84 cents per hundredweight in 1981 accounted for 9 percent of total direct costs. Operator and family labor is valued

Table 1.--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, All Regions

Item	1979		1980		1981 1/	
	Per cow	Per hundredweight 2/	Per cow	Per hundredweight	Per cow	Per hundredweight
	Dollars					
GROSS REVENUE:						
Milk	1540.01	11.93	1724.19	12.95	1867.95	13.72
Cull cows, calves & replacement sales	192.01	1.49	183.58	1.38	169.80	1.25
Total revenue	1732.02	13.42	1907.77	14.33	2037.75	14.97
DIRECT COSTS:						
Feed:						
Concentrates	390.34	3.02	445.61	3.35	475.15	3.49
Corn silage	73.49	.57	90.82	.68	94.71	.70
Hay	160.79	1.25	192.96	1.45	202.20	1.48
Haylage	59.19	.46	71.52	.54	79.17	.58
Pasture & miscellaneous forages	12.03	.09	14.13	.11	15.61	.11
Total feed costs	695.84	5.39	815.04	6.13	866.84	6.36
Other direct costs:						
Milk hauling	37.79	.29	43.87	.33	48.74	.36
Milk marketing	11.29	.09	12.66	.10	14.04	.10
Artificial insemination	12.18	.09	13.27	.10	14.61	.11
Veterinary & medicine	23.21	.18	25.07	.19	26.93	.20
Dairy supplies	22.56	.17	24.18	.18	26.13	.19
DHIA fees	5.37	.04	5.89	.04	6.61	.05
Livestock hauling	1.98	.02	2.44	.02	2.70	.02
Custom manure hauling	.23	0	.25	0	.36	0
Fuels & electricity	34.96	.27	50.10	.38	56.00	.41
Machinery & equipment repairs	39.36	.30	43.55	.33	47.65	.35
Hired labor	95.64	.74	102.68	.77	114.87	.84
Interest on operating capital	15.02	.12	20.76	.16	25.47	.19
Overhead	11.99	.09	12.98	.10	13.97	.10
Total other direct costs	311.58	2.40	357.70	2.70	398.08	2.92
Total direct costs	1007.42	7.79	1172.74	8.83	1264.92	9.28

Continued on next page.

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Table 1 (cont'd).--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, All Regions

Item	1979		1980		1981 1/	
	Per cow	Per hundred-weight 2/	Per cow	Per hundred-weight	Per cow	Per hundred-weight
	Dollars					
REVENUE ABOVE DIRECT COSTS.....	724.60	5.63	735.03	5.50	772.83	5.69
OWNERSHIP COSTS (RITI) 3/						
Machinery.....	61.69	.48	74.11	.56	86.32	.63
Buildings & equipment.....	122.99	.95	139.04	1.04	156.25	1.15
Livestock.....	179.55	1.39	236.08	1.77	263.59	1.94
Total ownership costs.....	364.23	2.82	449.23	3.37	506.16	3.72
Total direct and ownership costs.....	1371.65	10.61	1621.97	12.20	1771.08	13.00
RETURNS TO PRODUCER:						
Operator & family labor.....	157.41	1.22	168.42	1.27	186.35	1.37
Management 4/.....	202.96	1.59	117.38	.86	80.32	.60
Total returns to operator, family labor, and management 5/.....	360.37	2.81	285.80	2.13	266.67	1.97

1/ Preliminary.
2/ Hundredweight of milk represents all milk sold and consumed on the farm.
3/ Replacement reserve, interest on borrowed and equity capital, taxes, and insurance.
4/ Residual returns.
5/ Returns to equity capital are included in ownership costs.

Table 2.--Milk Production Costs and Returns by Selected Cost and Returns Items, by Regions and the U.S., 1979

Item	Northeast	Upper Midwest	Corn Belt	Appalachia	Southern Plains	Pacific	All Regions 1/
			Dollars per hundredweight 2/				
GROSS REVENUE:							
Milk	12.28	11.64	11.83	12.29	13.10	11.49	11.93
Cull cows, calves, & replacement sales	1.43	1.75	1.43	1.29	1.30	1.16	1.49
Total revenue	13.71	13.39	13.26	13.58	14.40	12.65	13.42
DIRECT COSTS:							
Feed costs	5.10	4.88	5.47	6.24	6.21	6.37	5.39
Other direct costs	2.59	2.14	2.56	2.81	2.54	2.28	2.40
Total direct costs	7.69	7.02	8.03	9.05	8.75	8.65	7.79
REVENUE ABOVE DIRECT COSTS	6.02	6.37	5.23	4.53	5.65	4.00	5.63
Ownership costs (RITI) 3/	2.79	3.13	3.28	2.67	1.96	2.09	2.82
Total direct and ownership costs	10.48	10.15	11.31	11.72	10.71	10.74	10.61
RETURNS TO PRODUCER:							
Operator and family labor	1.25	1.55	1.68	.94	.59	.32	1.22
Management 4/	1.98	1.69	.27	.92	3.10	1.59	1.59
Total returns to operator, family labor, and management 5/	3.23	3.24	1.95	1.86	3.69	1.91	2.81

1/ Weighted average.
2/ Hundredweight of milk represents all milk sold and consumed on the farm.
3/ Replacement reserve, interest on borrowed and equity capital, taxes, and insurance.
4/ Residual returns.
5/ Returns to equity capital are included in ownership costs.

Table 3.--Milk Production Costs and Returns by Selected Cost and Returns Items, by Regions and the U.S., 1980

Item	Northeast	Upper Midwest	Corn Belt	Appalachia	Southern Plains	Pacific	All Regions 1/
			Dollars per hundredweight 2/				
GROSS REVENUE:							
Milk	13.26	12.60	12.75	13.38	13.90	12.85	12.95
Cull cows, calves, & replacement sales	1.36	1.64	1.33	1.15	1.12	1.04	1.38
Total revenue	14.62	14.24	14.08	14.53	15.02	13.89	14.33
DIRECT COSTS:							
Feed costs	5.70	5.42	6.32	7.40	7.47	7.25	6.13
Other direct costs	2.88	2.40	2.87	3.10	2.80	2.52	2.70
Total direct costs	8.58	7.82	9.19	10.50	10.27	9.77	8.83
REVENUE ABOVE DIRECT COSTS	6.04	6.42	4.89	4.03	4.75	4.12	5.50
Ownership costs (RITI) 3/	3.33	3.81	3.88	3.09	2.65	2.35	3.37
Total direct and ownership costs	11.91	11.63	13.07	13.59	12.92	12.12	12.20
RETURNS TO PRODUCER:							
Operator and family labor	1.30	1.60	1.78	.97	.61	.34	1.27
Management 4/	1.41	1.01	-.77	-.03	1.49	1.43	.86
Total returns to operator, family labor, and management 5/	2.71	2.61	1.01	.94	2.10	1.77	2.13

1/ Weighted average.
2/ Hundredweight of milk represents all milk sold and consumed on the farm.
3/ Replacement reserve, interest on borrowed and equity capital, taxes, and insurance.
4/ Residual returns.
5/ Returns to equity capital are included in ownership costs.

Table 4.--Milk Production Costs and Returns by Selected Cost and Returns Items, by Regions and the U.S., 1981 1/

Item	Northeast	Upper Midwest	Corn Belt	Appalachia	Southern Plains	Pacific	All Regions 2/
			Dollars per hundredweight 3/				
GROSS REVENUE:							
Milk	14.08	13.37	13.49	14.17	14.84	13.47	13.72
Cull cows, calves, & replacement sales	1.20	1.51	1.20	1.02	1.03	.93	1.25
Total revenue	15.28	14.88	14.69	15.19	15.87	14.40	14.97
Direct costs:							
Feed costs	6.15	5.68	6.43	7.60	7.97	7.15	6.36
Other direct costs	3.12	2.60	3.14	3.42	3.19	2.73	2.92
Total direct costs	9.27	8.28	9.57	11.02	11.16	9.88	9.28
REVENUE ABOVE DIRECT COSTS	6.01	6.60	5.12	4.17	4.71	4.52	5.69
Ownership costs (RITI) 4/	3.70	4.17	4.36	3.47	2.98	2.46	3.72
Total direct and ownership costs	12.97	12.45	13.93	14.49	14.14	12.34	13.00
RETURNS TO PRODUCER:							
Operator and family labor	1.43	1.68	1.96	1.09	.73	.36	1.37
Management 5/	.88	.75	-1.20	-.39	1.00	1.70	.60
Total returns to operator, family labor, and management 6/	2.31	2.43	.76	.70	1.73	2.06	1.97

1/ Preliminary.
2/ Weighted average.
3/ Hundredweight of milk represents all milk sold and consumed on the farm.
4/ Replacement reserve, interest on borrowed and equity capital, taxes, and insurance.
5/ Residual returns.
6/ Returns to equity capital are included in ownership costs.

at the hired labor wage but is treated as a return to the producer in this report. Although there is substantial regional variation in hired labor used in dairy enterprises, operator and family labor plays an important role in many dairy operations since it supplies about 62 percent of the labor on the average dairy farm.

Other direct costs

Total other direct production costs, of which hired labor is a part, were $2.92 per hundredweight in 1981, a rise of 8.1 percent following a rise of 12.5 percent in 1980. Hired labor, milk hauling, fuels and electricity, and machinery and equipment repairs make up the highest proportion of these costs.

OWNERSHIP COSTS

Ownership costs include depreciation of machinery, buildings, equipment, and livestock (a replacement reserve in lieu of depreciation), interest, personal property taxes, and insurance. Total ownership costs per hundredweight were $3.72 in 1981, a rise of 10.4 percent from 1980, following a rise of 19.5 percent in 1980. These increases are due to the combined relationships of values of buildings, equipment, livestock, and interest rates. Both interest rates and livestock values increased substantially from 1979 to 1980 and continued to increase, but at a slower rate, from 1980 to 1981.

During the 1979–81 period, ownership costs made up about 28 percent of total direct and ownership costs; livestock costs accounted for 52 percent of total ownership costs. Buildings and equipment accounted for about 31 percent of total ownership costs and machinery associated with the dairy enterprise made up the remaining 17 percent.

Economic theory postulates that high returns in any economic activity will be capitalized into the cost of the factors of production. Dairy cow prices rose from under $500 per head in early 1977 to a peak of $1,230 on a national average basis in November 1980 (appendix table 2), which adds to the dilemma of computing cost of production. For example, during the 1979–81 period, the slaughter value of dairy cattle averaged about $550 per head. If one adds a margin of $200 per head for dairy cows in the herd, the value of a dairy cow would have been $750 rather than $1,200, and livestock ownership costs would have been 37 percent less over the 3-year period. This would have amounted to about 72 cents per hundredweight in 1981.

The rapidly increased costs of dairy cows are real costs to farmers entering the dairy business or purchasing cows to expand their herds during periods of relatively high dairy cow prices. However, most dairymen already owned their dairy herds and most of their replacements during this period. In these instances, the computed ownership costs are actually a return to operator equity in the dairy enterprise. Costs in these instances only arise in an "opportunity cost" sense.

Land allocation

Land allocation costs per cow are minimal in these dairy budgets because they include only the land base needed for the dairy farmstead. Land costs associated with the dairy farmstead are included under ownership costs (usually 5 cents or less per hundredweight of milk produced). Forage budgets, however, include a cost for cropland, which is included in the forage costs.

DAIRY ENTERPRISE REVENUE

Two sources of dairy enterprise revenue are milk sales and dairy livestock (cull cows, calves, and dairy replacements) sales. The primary source of revenue is fluid milk sales, but gross revenue from sales of cull cows, calves, and dairy replacements averaged 10 percent of total dairy enterprise revenue in the 1979–81 period (table 1). This source of revenue varies substantially among regions and from year-to-year. In 1981, dairy livestock revenue amounted to 8.4 percent of gross dairy enterprise revenue compared with 9.6 percent in 1980 and 11.1 percent in 1979. The decline in the proportion of revenue from dairy livestock over the 3-year period resulted from milk prices to dairy farmers increasing from $11.93 per hundredweight in 1979 to $13.72 (15 percent) from 1979 to 1981 while revenue from dairy livestock declined by 16 percent—primarily due to lower cull cow prices.

Total gross revenue to the dairy enterprise of $14.97 per hundredweight in 1981 was up 4.5 percent from $14.33 in 1980, and up 11.5 percent from $13.42 in 1979. Total revenue per cow of $2,038 in 1981 was up 17.7 percent from the $1,732 received in 1979.

One measure of the well-being of dairy farmers—at least in the short run—is the amount of net revenue remaining after payment of direct (cash) costs. The weighted average all region revenue above direct costs amounted to $5.69 per hundredweight in 1981 compared with $5.50 in 1980 and $5.63 in 1979. On a per cow basis, revenue above direct costs averaged $773 in 1981, up 5.1 percent from $735 in 1980, and up 6.7 percent from $725 in 1979.

RETURNS TO PRODUCER

Total returns to operator, family labor, and management (gross revenue less total direct and ownership costs) averaged $1.97 per hundredweight in 1981 compared with $2.13 in 1980, and $2.81 in 1979 (table 1). On a per cow basis these returns averaged $267 in 1981 compared with $286 in 1980 and $360 in 1979. One must be cautious in interpreting these figures for evaluating profitability of dairying or dairy farmer well-being at any point in time. It is more appropriate to use these data to evaluate comparative advantage of milk production between regions and the relative well-being of dairymen from year to year. Profitability of dairying in an economic sense—at least in the aggregate and in the long run—is best indicated by supply response of dairymen.

Operator and family labor

Operator and family labor is valued at the hired labor wage in this report and is treated as a return to the producer. Operator and family labor use is based on results of the 1980 producer survey.

Returns associated with operator and family labor were $186.35 per cow in 1981, up 10.6 percent from 1980 and 18.4 percent from 1979. These returns of $1.37 per hundredweight of milk produced in 1981 increased by 10 cents from 1980, and another 5 cents from 1979 to 1980.

Management

In previous reports the management charge was based on 7 percent of total costs and, therefore, fluctuated in response to changes in total

cost. In this report management of the dairy enterprise and risk associated with dairying are treated as residual returns to the producer. Returns per cow to management and risk averaged $80.32 in 1981 compared with $117.38 in 1980, and $202.96 in 1979.

REGIONAL HIGHLIGHTS

Both milk prices received by farmers and milk production costs varied greatly among regions, but the range in milk production costs was wider than that for milk prices received (tables 2, 3, and 4). In 1981, for example, direct and ownership costs associated with milk production were estimated at $14.49 per hundredweight in the Appalachian region—11 percent above the U.S. average of $13 per hundredweight. At the low end of the spectrum, direct and overhead costs in the Pacific and Upper Midwest were $12.34 and $12.45 per hundredweight, respectively, or about 5 percent below the U.S. average. The Corn Belt and Southern Plains regions also had relatively high costs per hundredweight, while the Northeast tended to have somewhat lower costs.

Feed costs tended to be relatively high in the Appalachian, Southern Plains, and Pacific regions, and were lowest in the Upper Midwest. In contrast, ownership costs were relatively high in the Corn Belt and Upper Midwest, and lowest in the Pacific and Southern Plains regions. Differences in ownership costs from one region to another are chiefly accounted for by differences in housing requirements due to climate (tables 5 through 10).

Table 5.--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Northeast Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
			Dollars			
GROSS REVENUE:						
Milk	1634.67	12.28	1807.89	13.26	1967.16	14.08
Cull cows, calves & replacement sales	190.21	1.43	185.02	1.36	167.77	1.20
Total revenue	1824.88	13.71	1992.91	14.62	2134.93	15.28
DIRECT COSTS:						
Feed:						
Concentrates	402.70	3.03	458.33	3.36	509.55	3.65
Corn silage	87.45	.66	102.71	.75	110.35	.79
Hay	117.52	.88	138.73	1.02	153.53	1.10
Haylage	64.28	.48	69.10	.51	76.90	.55
Pasture & miscellaneous forages	7.29	.05	8.51	.06	9.01	.06
Total feed costs	679.24	5.10	777.38	5.70	859.34	6.15
Other direct costs:						
Milk hauling	41.57	.31	47.92	.35	53.39	.38
Milk marketing	12.46	.09	14.33	.11	15.11	.11
Artificial insemination	13.73	.10	14.97	.11	16.48	.12
Veterinary & medicine	27.09	.20	29.25	.21	31.42	.22
Dairy supplies	24.28	.18	23.64	.17	25.55	.18
DHIA fees	5.64	.04	6.20	.05	7.14	.05
Livestock hauling	1.69	.01	2.08	.02	2.30	.02
Custom manure hauling	0	0	0	0	0	0
Fuels & electricity	36.96	.28	51.64	.38	58.61	.42
Machinery & equipment repairs	37.98	.29	42.33	.31	46.19	.33
Hired labor	116.88	.88	124.65	.91	139.76	1.00
Interest on operating capital	15.11	.11	19.98	.15	25.83	.18
Overhead	13.62	.10	14.84	.11	15.99	.11
Total other direct costs	347.01	2.59	391.83	2.88	437.77	3.12
Total direct costs	1026.25	7.69	1169.21	8.58	1297.11	9.27

Continued on next page.

Table 5 (cont'd).--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Northeast Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
			Dollars			
REVENUE ABOVE DIRECT COSTS.....	798.63	6.02	823.70	6.04	837.82	6.01
OWNERSHIP COSTS (RITI) 4/						
Machinery.....	60.84	.46	72.16	.53	84.91	.61
Buildings & equipment.....	134.95	1.01	151.72	1.12	171.42	1.23
Livestock.....	175.02	1.32	229.65	1.68	260.33	1.86
Total ownership costs.....	370.81	2.79	453.53	3.33	516.66	3.70
Total direct and ownership costs.....	1397.06	10.48	1622.74	11.91	1813.77	12.97
RETURNS TO PRODUCER:						
Operator & family labor.....	166.02	1.25	177.46	1.30	199.69	1.43
Management 5/.....	261.80	1.98	192.71	1.41	121.47	.88
Total returns to operator, family labor, and management 6/.....	427.82	3.23	370.17	2.71	321.16	2.31

1/ States represented: Ohio, Pennsylvania, New York, Vermont, Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine.
2/ Preliminary.
3/ Hundredweight of milk represents all milk sold and consumed on the farm.
4/ Replacement reserve, interest on borrowed and equity capital, taxes, and insurance.
5/ Residual returns.
6/ Returns to equity capital are included in ownership costs.

Table 6.--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Upper Midwest Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
			Dollars			
GROSS REVENUE:						
Milk	1438.25	11.64	1593.87	12.60	1732.22	13.37
Cull cows, calves & replacement sales	216.81	1.75	208.04	1.64	196.23	1.51
Total revenue	1655.06	13.39	1801.91	14.24	1928.45	14.88
DIRECT COSTS:						
Feed:						
Concentrates	321.43	2.60	346.41	2.74	357.01	2.76
Corn silage	74.70	.60	88.68	.70	96.59	.75
Hay	126.79	1.03	149.61	1.18	168.11	1.30
Haylage	74.08	.60	93.74	.74	105.41	.81
Pasture & miscellaneous forages	6.13	.05	7.49	.06	8.35	.06
Total feed costs	603.13	4.88	685.93	5.42	735.47	5.68
Other direct costs:						
Milk hauling	26.64	.22	30.87	.24	34.26	.26
Milk marketing	6.49	.05	6.90	.05	8.29	.06
Artificial insemination	10.91	.09	11.89	.09	13.09	.10
Veterinary & medicine	24.18	.20	26.12	.21	28.05	.22
Dairy supplies	18.75	.15	20.81	.16	22.50	.17
DHIA fees	5.02	.04	5.51	.04	5.86	.05
Livestock hauling	2.93	.02	3.60	.03	3.98	.03
Custom manure hauling	0	0	0	0	0	0
Fuels & electricity	35.17	.28	50.45	.40	55.43	.43
Machinery & equipment repairs	39.36	.32	43.73	.35	47.72	.37
Hired labor	69.12	.56	72.89	.58	79.83	.62
Interest on operating capital	13.69	.11	19.17	.15	22.90	.18
Overhead	11.78	.10	12.94	.10	13.90	.11
Total other direct costs	264.04	2.14	304.88	2.40	335.81	2.60
Total direct costs	867.17	7.02	990.81	7.82	1071.28	8.28

Continued on next page.

Table 6 (cont'd).--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Upper Midwest Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
			Dollars			
REVENUE ABOVE DIRECT COSTS.....	787.89	6.37	811.10	6.42	857.17	6.60
OWNERSHIP COSTS (RITI) 4/						
Machinery.....	62.93	.51	76.70	.61	88.41	.68
Buildings & equipment.....	146.63	1.19	166.92	1.31	186.69	1.44
Livestock.....	176.29	1.43	238.80	1.89	265.99	2.05
Total ownership costs.....	385.85	3.13	482.42	3.81	541.09	4.17
Total direct and ownership costs.....	1253.02	10.15	1473.23	11.63	1612.37	12.45
RETURNS TO PRODUCER:						
Operator & family labor.....	191.34	1.55	201.87	1.60	217.23	1.68
Management 5/.....	210.70	1.69	126.81	1.01	98.85	.75
Total returns to operator, family labor, and management 6/.....	402.04	3.24	328.68	2.61	316.08	2.43

1/ States represented: Minnesota, Wisconsin, Michigan, and South Dakota.
2/ Preliminary.
3/ Hundredweight of milk represents all milk sold and consumed on the farm.
4/ Replacement reserve, interest on borrowed and equity capital, taxes, and insurance.
5/ Residual returns.
6/ Returns to equity capital are included in ownership costs.

Table 7.--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Corn Belt Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
			Dollars			
GROSS REVENUE:						
Milk	1432.46	11.83	1606.46	12.75	1736.68	13.49
Cull cows, calves & replacement sales	173.47	1.43	168.18	1.33	154.72	1.20
Total revenue	1605.93	13.26	1774.64	14.08	1891.40	14.69
DIRECT COSTS:						
Feed:						
Concentrates	383.65	3.17	424.07	3.37	458.70	3.56
Corn silage	67.43	.56	87.75	.70	81.87	.64
Hay	126.43	1.04	178.33	1.42	178.78	1.39
Haylage	67.86	.56	84.15	.67	87.88	.68
Pasture & miscellaneous forages	17.03	.14	19.71	.16	21.16	.16
Total feed costs	662.40	5.47	794.01	6.32	828.39	6.43
Other direct costs:						
Milk hauling	48.71	.40	56.68	.45	63.06	.49
Milk marketing	10.19	.08	11.44	.09	12.66	.10
Artificial insemination	12.64	.10	13.79	.11	15.17	.12
Veterinary & medicine	22.61	.19	24.41	.19	26.23	.20
Dairy supplies	21.81	.18	24.21	.19	26.17	.20
DHIA fees	5.58	.05	6.13	.05	7.06	.05
Livestock hauling	1.28	.01	1.57	.01	1.74	.01
Custom manure hauling	0	0	0	0	0	0
Fuels & electricity	44.72	.37	63.59	.50	70.29	.55
Machinery & equipment repairs	43.48	.36	48.48	.38	52.99	.41
Hired labor	70.77	.58	77.35	.61	87.23	.68
Interest on operating capital	15.14	.13	21.50	.17	26.71	.21
Overhead	13.24	.11	14.51	.12	15.56	.12
Total other direct costs	310.17	2.56	363.66	2.87	404.89	3.14
Total direct costs	972.57	8.03	1157.67	9.19	1233.28	9.57

Continued on next page.

Table 7 (cont'd).—Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Corn Belt Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
			Dollars			
REVENUE ABOVE DIRECT COSTS.....	633.36	5.23	616.97	4.89	658.12	5.12
OWNERSHIP COSTS (RITI) 4/						
Machinery.....	77.48	.64	93.37	.74	109.58	.85
Buildings & equipment.....	146.77	1.21	165.71	1.31	186.43	1.45
Livestock.....	172.55	1.43	230.96	1.83	264.81	2.06
Total ownership costs.....	396.80	3.28	490.04	3.88	560.82	4.36
Total direct and ownership costs.....	1369.37	11.31	1647.71	13.07	1794.10	13.93
RETURNS TO PRODUCER:						
Operator & family labor.....	203.41	1.68	223.70	1.78	252.02	1.96
Management 5/.....	33.15	.27	-96.77	-.77	-154.72	-1.20
Total returns to operator, family labor, and management 6/.....	236.56	1.95	126.93	1.01	97.30	.76

1/ States represented: Iowa, Illinois, Indiana, and Missouri.
2/ Preliminary.
3/ Hundredweight of milk represents all milk sold and consumed on the farm.
4/ Replacement reserve, interest on borrowed and equity capital, taxes, and insurance.
5/ Residual returns.
6/ Returns to equity capital are included in ownership costs.

Table 8.--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Appalachian Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
			Dollars			
GROSS REVENUE:						
Milk	1550.60	12.29	1753.77	13.38	1895.71	14.17
Cull cows, calves & replacement sales	162.56	1.29	151.42	1.15	137.03	1.02
Total revenue	1713.16	13.58	1905.19	14.53	2032.74	15.19
DIRECT COSTS:						
Feed:						
Concentrates	482.89	3.83	567.46	4.33	603.10	4.51
Corn silage	112.18	.89	157.53	1.20	150.17	1.12
Hay	131.41	1.04	171.72	1.31	184.31	1.38
Haylage	28.52	.23	38.57	.29	40.43	.30
Pasture & miscellaneous forages	31.01	.25	35.82	.27	39.25	.29
Total feed costs	786.01	6.24	971.10	7.40	1017.26	7.60
Other direct costs:						
Milk hauling	50.75	.40	58.79	.45	65.71	.49
Milk marketing	14.16	.11	15.78	.12	17.46	.13
Artificial insemination	12.18	.10	13.27	.10	14.61	.11
Veterinary & medicine	18.85	.15	20.36	.16	21.87	.16
Dairy supplies	27.85	.22	30.91	.24	33.42	.25
DHIA fees	5.57	.04	6.12	.05	7.04	.05
Livestock hauling	1.14	.01	1.41	.01	1.56	.01
Custom manure hauling	0	0	0	0	0	0
Fuels & electricity	34.42	.27	50.44	.38	57.03	.42
Machinery & equipment repairs	33.50	.27	37.39	.29	40.95	.31
Hired labor	126.92	1.01	135.53	1.03	155.85	1.16
Interest on operating capital	16.16	.13	22.40	.17	27.87	.21
Overhead	12.45	.10	13.47	.10	14.59	.11
Total other direct costs	353.95	2.81	405.87	3.10	457.96	3.42
Total direct costs	1139.96	9.05	1376.97	10.50	1475.22	11.02

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Table 8 (cont'd).--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Appalachian Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
			Dollars			
REVENUE ABOVE DIRECT COSTS.....	573.20	4.53	528.22	4.03	557.52	4.17
OWNERSHIP COSTS (RITI) 4/						
Machinery.....	62.66	.50	74.07	.56	86.93	.65
Buildings & equipment.....	102.04	.81	113.60	.86	128.25	.96
Livestock.....	171.23	1.36	219.37	1.67	249.01	1.86
Total ownership costs.....	335.93	2.67	407.04	3.09	464.19	3.47
Total direct and ownership costs.....	1475.89	11.72	1784.01	13.59	1939.41	14.49
RETURNS TO PRODUCER:						
Operator & family labor.....	118.04	.94	126.66	.97	146.36	1.09
Management 5/.....	119.23	.92	-5.48	-.03	-53.03	-.39
Total returns to operator, family labor, and management 6/.....	237.27	1.86	121.18	.94	93.33	.70

1/ States represented: Kentucky, Tennessee, Virginia, North Carolina, and Georgia.
2/ Preliminary.
3/ Hundredweight of milk represents all milk sold and consumed on the farm.
4/ Replacement reserve, interest on borrowed and equity capital, taxes, and insurance.
5/ Residual returns.
6/ Returns to equity capital are included in ownership costs.

Table 9.--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Southern Plains Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
			Dollars			
GROSS REVENUE:						
Milk	1642.61	13.10	1830.62	13.90	1954.41	14.84
Cull cows, calves & replacement sales	162.43	1.30	147.23	1.12	135.64	1.03
Total revenue	1805.04	14.40	1977.85	15.02	2090.05	15.87
DIRECT COSTS:						
Feed:						
Concentrates	507.82	4.05	616.14	4.68	651.26	4.95
Corn silage	5.84	.05	9.87	.07	10.48	.08
Hay	238.45	1.90	322.62	2.45	345.84	2.63
Haylage	13.82	.11	21.64	.16	23.73	.18
Pasture & miscellaneous forages	12.77	.10	14.75	.11	16.53	.13
Total feed costs	778.70	6.21	985.02	7.47	1047.84	7.97
Other direct costs:						
Milk hauling	52.66	.42	61.90	.47	67.17	.51
Milk marketing	18.81	.15	22.39	.17	25.02	.19
Artificial insemination	8.21	.07	8.95	.07	9.85	.07
Veterinary & medicine	15.19	.12	16.41	.12	17.62	.13
Dairy supplies	33.59	.27	37.29	.28	40.31	.31
DHIA fees	1.53	.01	1.70	.01	1.95	.01
Livestock hauling	.69	.01	.85	.01	.94	.01
Custom manure hauling	0	0	0	0	0	0
Fuels & electricity	24.62	.20	36.92	.28	41.95	.32
Machinery & equipment repairs	18.24	.15	20.26	.15	22.28	.17
Hired labor	118.35	.94	128.97	.98	154.25	1.17
Interest on operating capital	15.16	.12	23.12	.18	28.22	.21
Overhead	10.23	.08	11.17	.08	12.04	.09
Total other direct costs	317.28	2.54	369.93	2.80	421.60	3.19
Total direct costs	1095.98	8.75	1354.95	10.27	1469.44	11.16

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Table 9 (cont'd).--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980 and Preliminary 1981, Southern Plains Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
	Dollars					
REVENUE ABOVE DIRECT COSTS.....	709.06	5.65	622.90	4.75	620.61	4.71
OWNERSHIP COSTS (RITI) 4/						
Machinery.....	39.75	.32	48.03	.36	55.67	.42
Buildings & equipment.....	43.80	.35	50.93	.39	57.82	.44
Livestock.....	162.27	1.29	249.74	1.90	278.67	2.12
Total ownership costs.....	245.82	1.96	348.70	2.65	392.16	2.98
Total direct and ownership costs.....	1341.80	10.71	1703.65	12.92	1861.60	14.14
RETURNS TO PRODUCER:						
Operator & family labor.....	73.81	.59	80.43	.61	96.20	.73
Management 5/.....	389.43	3.10	193.77	1.49	132.25	1.00
Total returns to operator, family labor, and management 6/.....	463.24	3.69	274.20	2.10	228.45	1.73

1/ States represented: Texas.
2/ Preliminary.
3/ Hundredweight of milk represents all milk sold and consumed on the farm.
4/ Replacement reserve, interest on borrowed and equity capital, taxes, and insurance.
5/ Residual returns.
6/ Returns to equity capital are included in ownership costs.

Table 10.—Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Pacific Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
	Dollars					
GROSS REVENUE:						
Milk	1708.89	11.49	1996.88	12.85	2143.82	13.47
Cull cows, calves & replacement sales	173.19	1.16	162.22	1.04	147.36	.93
Total revenue	1882.08	12.65	2159.10	13.89	2291.18	14.40
DIRECT COSTS:						
Feed:						
Concentrates	465.48	3.13	586.35	3.77	613.33	3.85
Corn silage	32.00	.22	41.11	.26	44.88	.28
Hay	396.54	2.67	439.14	2.83	410.04	2.58
Haylage	33.41	.22	39.33	.25	45.00	.28
Pasture & miscellaneous forages	18.98	.13	22.42	.14	26.17	.16
Total feed costs	946.41	6.37	1128.35	7.25	1139.42	7.15
Other direct costs:						
Milk hauling	36.82	.25	43.34	.28	47.98	.30
Milk marketing	19.72	.13	22.19	.14	24.35	.15
Artificial insemination	13.26	.09	14.46	.09	15.91	.10
Veterinary & medicine	18.36	.12	19.82	.13	21.30	.13
Dairy supplies	23.35	.16	25.97	.17	28.07	.18
DHIA fees	6.56	.04	7.19	.05	8.23	.05
Livestock hauling	1.57	.01	1.93	.01	2.13	.01
Custom manure hauling	1.95	.01	2.10	.01	3.06	.02
Fuels & electricity	23.51	.16	35.50	.23	40.71	.26
Machinery & equipment repairs	49.38	.33	52.78	.34	58.40	.37
Hired labor	120.99	.81	134.38	.86	147.65	.93
Interest on operating capital	17.71	.12	24.45	.16	28.34	.18
Overhead	7.88	.05	7.51	.05	8.07	.05
Total other direct costs	341.06	2.28	391.62	2.52	434.20	2.73
Total direct costs	1287.47	8.65	1519.97	9.77	1573.62	9.88

Continued on next page.

Table 10 (cont'd).--Milk Production Costs and Returns per Cow and per Hundredweight, by Cost and Returns Items, 1979, 1980, and Preliminary 1981, Pacific Region 1/

Item	1979		1980		1981 2/	
	Per cow	Per hundredweight 3/	Per cow	Per hundredweight	Per cow	Per hundredweight
	Dollars					
REVENUE ABOVE DIRECT COSTS.....	594.61	4.00	639.13	4.12	717.56	4.52
OWNERSHIP COSTS (RITI) 4/						
Machinery.....	49.39	.33	58.73	.38	68.02	.43
Buildings & equipment.....	41.82	.29	46.94	.31	52.57	.33
Livestock.....	218.69	1.47	257.41	1.66	270.26	1.70
Total ownership costs.....	309.90	2.09	363.08	2.35	390.85	2.46
Total direct and ownership costs.....	1597.37	10.74	1883.05	12.12	1964.47	12.34
RETURNS TO PRODUCER:						
Operator & family labor.....	46.90	.32	52.34	.34	57.25	.36
Management 5/.....	237.81	1.59	223.71	1.43	269.46	1.70
Total returns to operator, family labor, and management 6/.....	284.71	1.91	276.05	1.77	326.71	2.06

1/ States represented: California and Washington.
2/ Preliminary.
3/ Hundredweight of milk represents all milk sold and consumed on the farm.
4/ Replacement reserve, interest on borrowed and equity capital, taxes, and insurance.
5/ Residual returns.
6/ Returns to equity capital are included in ownership costs.

Farmers in the Upper Midwest, Corn Belt, and Pacific regions received an average price of around $13.50 per hundredweight of milk in 1981, while farmers in the Northeast, Appalachian, and Southern Plains regions received an average price in 1981 of $14.08, $14.17, and $14.84, respectively (table 4). The average price received by farmers in all regions varied less among regions than did costs of production, since the price in the Southern Plains was $1.12 (8 percent) above the national average and the price in the Upper Midwest was 35 cents (3 percent) lower. Prices received by farmers were highest in the Southern Plains in all 3 years, while prices were lowest in the Pacific in 1979, and in the Upper Midwest in 1980 and 1981 (tables 2, 3, and 4). Prices received by farmers in the Corn Belt were never the lowest of any region, but were within 2 percentage points of the lowest in all 3 years.

Revenue from sales of cull cows, calves, and dairy replacements averaged 10 percent of gross revenue to the dairy enterprise in the 3-year period of 1979 through 1981. This source of revenue varies substantially among regions. Dairy livestock revenue as a percentage of gross dairy enterprise revenue was highest in the Upper Midwest—averaging 11.6 percent over the 3 years. Sales of dairy replacements—especially sales out of Wisconsin—tended to enhance this percentage relative to the average. In contrast, dairy livestock revenue in the Southern Plains and Pacific regions made the lowest percentage contribution to total dairy enterprise revenue—averaging 7.7 percent over the 1979–81 period.

A number of categories of net revenue and returns to producers can be evaluated in comparing regional dairy farmer well-being or regional comparative advantage of milk production. Two broad indicators of producer well-being in this report are revenue above direct costs and total returns to operator, family labor, and management (gross dairy enterprise revenue minus total direct and ownership costs). This latter category is further broken down into returns to operator and family labor (reported hours of operator and family labor use valued at the hired labor wage) and management (a residual return).

An examination of the data, however, shows that there probably is no single adequate measure of dairy farmer well-being because of the diverse nature of the regional milk production inputs bundle. Comparing the returns by different indicators in the Pacific and Corn Belt regions in 1981, for example, shows that revenue above direct costs of $4.52 per hundredweight in the Pacific region was relatively low compared with the $5.12 per hundredweight in the Corn Belt region (table 4). Likewise, returns to operator and family labor were only 36 cents per hundredweight in the Pacific region compared with $1.96 in the Corn Belt. In contrast, total returns to operator, family labor, and management were $2.06 per hundredweight in the Pacific region and 76 cents in the Corn Belt. Residual returns to management in 1981 of $1.70 per hundredweight in the Pacific region were the highest of any region, while the Corn Belt's—$1.20 per hundredweight was the lowest of any region.

Profitability and comparative advantage of dairying—at least in the aggregate and in the long run—are probably best indicated by supply-response of dairy farmers, as exemplified by the decline in milk production in the Corn Belt in recent years—a region where the costs

and returns of milk production provide the lowest return to management of any region. Many farmers in this region shifted to producing corn and soybeans in the seventies. In contrast, there has been a rapid increase in milk production in the Pacific region—an area with the highest regional residual return to management. Also, from the standpoint of milk supply response, one would have to consider profitability of milk production relative to other farm and off-farm opportunities in the higher-cost regions—two important milk supply forces that are not addressed in this report.

Since this regional analysis focuses on costs per hundredweight of milk produced, milk production per cow has an important influence on this measure of cost, and varies substantially among regions (appendix table 1). The estimated weighted average milk production per cow in all regions in 1981 was 13,617 pounds. In the Pacific region, output per cow at 15,913 pounds was 2,296 pounds (17 percent) above the weighted average for all regions. In contrast, milk production per cow averaged 12,877 pounds in the Corn Belt, and 12,957 pounds in the Upper Midwest—about 5 percent less than the overall average for all regions. Output per cow averaged 13,170 pounds in the Southern Plains region, 13,382 pounds in Appalachia, and 13,972 pounds in the Northeast. Over the 3-year period from 1979 to 1981, output per cow increased by 5.5 percent in the United States, but increased by 7 percent in the Pacific region and about 5 percent in the Northeast, Appalachian, and Southern Plains regions.

INCOME CONSIDERATIONS

This study considers the interrelationship between costs of production and returns from sale of dairy products and joint dairy livestock products. The States in which dairy farmers were interviewed for this study had 8,925,400 milk cows, about 84 percent of the milk cows on farms in 1979. Average herd size for the farms sampled was 80 cows. Using this average 80-cow herd as an example, revenue above direct cost of $61,840 in 1981, $58,800 in 1980, and $58,000 in 1979 were estimated (table 11). Returns to operator, family labor, and management of $21,360 in 1981, $22,880 in 1980, and $28,800 in 1979 were estimated. Adjusting these estimated returns to 1979 dollars to correct for inflation yields revenue above direct costs of $58,000 per herd in 1979, $53,965 in 1980 and $52,000 in 1981. Likewise, in real terms, returns to operator, family labor, and management were $28,800 in 1979, $21,000 in 1980, and $17,960 in 1981.

TABLE 11.--SUMMARY OF TOTAL DAIRY ENTERPRISE INCOME, TOTAL DIRECT COSTS, AND NET RETURNS TO OPERATOR AND FAMILY LABOR, MANAGEMENT, AND RISK

Item	1979	1980	1981
		Dollars	
Total revenue, per cow	1,732	1,908	2,038
Total direct costs, per cow	1,007	1,173	1,265
Total revenue above direct costs:			
Per cow	725	735	773
Per 80-cow herd (current dollars)	58,000	58,800	61,840
Per 80-cow herd (1979 dollars) 1/	58,000	53,965	52,000
Total direct and ownership costs, per cow	1,372	1,622	1,771
Return to operator, family labor, and management:			
Per cow	360	286	267
Per 80-cow herd (current dollars)	28,800	22,880	21,360
Per 80-cow herd (1979 dollars) 1/	28,800	21,000	17,960

1/ Adjusted by the Implicit Price Deflator for the Gross National Product.

METHODS AND CONCEPTS

This section explains the methods used to estimate the costs of production, and the components of each cost item in the enterprise budgets.

FIRM ENTERPRISE DATA SYSTEM

The firm enterprise data system (FEDS) provides the computational vehicle for estimating dairy production costs. This system consists of a series of computerized enterprise budgets serviced by an aggregation program to compute an average cost of milk production for the United States.

The FEDS dairy budgets—for the 19 major dairy States plus New England—include variable costs, machinery ownership costs, and general farm overhead costs. Variable costs include expenditures for feed, milk hauling, artificial insemination, veterinary and medicine, labor, fuel and lubricants, electricity, repairs, interest, and miscellaneous items. Machinery ownership costs include charges for replacement, interest, taxes, and insurance. General farm overhead includes costs for recordkeeping, telephone, general farm maintenance, and similar items that are difficult to allocate to a specific enterprise.

SURVEY DATA

Much of the input data used in the FEDS computations reported here was obtained from the 1980 survey. In a significant shift from previous years, several forage production budgets were developed for each of the surveyed States. These forage budgets use physical relationships obtained from the 1980 survey to compute the cost of producing hay and forage crops such as ensilage and haylage.

Fertilizer application rates, number of hay cuttings per year, and machinery types and hours of use are examples of farm data used to construct the forage budgets. Costs per ton were calculated for alfalfa hay and haylage, other hay and haylage, corn ensilage, and pasture and miscellaneous forage. These costs were then incorporated in the feed cost calculation for the dairy budgets. In all previous reports of this series, the published price of "all hay" was used to estimate the cost of hay, haylage, corn ensilage, and pasture and miscellaneous forage.

The 1980 survey provided many other pieces of physical and economic data for direct use in computing the cost of production for a representative farm in each State surveyed. New information on the quantity of forage fed to cows, hours of chore and milking labor, and costs of milk hauling and marketing were obtained. Costs per head were obtained for such expenses as artificial insemination, veterinary and medicine, dairy supplies, livestock hauling, fuels and electricity,

machinery and equipment repairs, interest on operating capital, overhead, and Dairy Herd Improvement Association (DHIA) fees.

The costs and production input-output coefficients for 1979 were updated for 1980 and 1981 using prices, production data, and indexes reported by SRS. Some budget data for 1981 are based on preliminary data reported by the Crop Reporting Board, SRS.

SAMPLING FRAME AND DAIRY FARM SIZE

The average farm size for each State was somewhat larger than the 1974 average, due partly to an average size change associated with time. Size was most influenced by the sampling procedure used to select the farms. The sampling frame selected was on the basis of probability proportional to size (PPS). Probability of selection was based on numbers of cows in the herd; therefore, the larger farms had a greater chance of selection.[1] This method reflects costs and resource use associated with the overall quantity of milk produced.

JOINT REVENUE

Dairy farms produce revenue from the sale of both milk and meat (cull cows, calves, and dairy replacements). The revenues from each are easy to identify, but it is difficult to separate their production costs. This problem has been treated differently over the years. This report shows the revenue from milk and meat sales separately, but their production costs are not separated. In the August 1979 and July 1980 reports the income received from the sale of cull cows and calves was shown separately as a downward adjustment in total costs resulting in total net costs. This procedure kept the cost-per-cow columns comparable with all previous reports, since only the "total net cost" item is different. In this report and in the August 1979 and July 1980 reports all components in the cost-per-hundredweight columns are higher than in the reports in this series published prior to 1979, since meat values in the earlier reports were converted to milk equivalents, resulting in a larger divisor for the cost-per-hundredweight columns.

COST ALLOCATION

For dairy farms consisting of more than just the dairy enterprise, further problems arise in allocating certain costs among enterprises. For such farms, there is no single procedure to allocate general overhead costs to the various enterprises.

Intensity of use is a factor in determining cost allocation. Items used exclusively by the dairy enterprise are charged at an annual rate regardless of the intensity of their use. Items used extensively in other enterprises are charged at an hourly rate, and costs are allocated among enterprises based on the number of hours used in each enterprise.

FEED

Previous reports used the average market price for hay, since hay production costs were not available. With the data from the 1980

[1] A farm with 100 cows, for example, was 10 times more likely to have been in the sample than a farm with only 10 cows.

dairy survey, FEDS forage budgets (corn ensilage, hay, haylage, pasture, and miscellaneous forages) were made for each of the dairy States. The amount of forage fed to dairy animals in each of the State FEDS budgets was obtained through the 1980 survey. The survey also provided information on the proportion of forages purchased or raised. Forage costs were developed by weighting the costs of purchased and raised forage. Dairy concentrate costs were estimated using the reported milk production and grain-feeding ratios and prices published by SRS.

LABOR

Hours of labor used in these dairy budgets were obtained from the 1980 farm survey. Wage rates for operator and family labor, as well as hired workers, were based on published wage rates for hired workers. Hired labor also includes the employer's share of the social security tax.

INTEREST

Interest on operating capital was calculated using the 1979, 1980, and 1981 Production Credit Association (PCA) local interest rate. The average time that feed, grain, and other items are in the dairy enterprise inventory was set at 3 months for determining the value of inventory subject to this interest rate. The interest on the machinery and equipment investment required by the dairy enterprise was charged annually at the PCA rate. Interest charged on livestock investment was computed using the PCA rate times the January 1 inventory value.

OVERHEAD COSTS

Items in the overhead category include registration and licensing fees, fence materials and supplies, farm telephone expenses, farm water (excluding irrigation water) expenses, and general business expenses. The 1979 farm production expenditure survey conducted by the Statistical Reporting Service provided the data for this study. Overhead expenditures for dairy farms with 70 percent or more of their income from milk were calculated on a regional basis. These costs were updated for 1980 and 1981 by using the Consumer Price Index for all items less food. Items such as hauling costs, breeding fees, and veterinary and medicine expenses were updated from the 1980 survey by using the indices and prices published by USDA.

OWNERSHIP COSTS

Prices of buildings, equipment, and machinery are lagged to provide the basis for calculating interest and tax costs. Permanent structures are lagged 15 years, equipment 2 years, and machinery 4 years. Repairs, insurance, and replacement reserve charge (in lieu of depreciation) are based on current prices. The replacement charge concept assumes that a capital reserve must be set aside to facilitate replacement of equipment, machinery, and buildings over time. See the FEDS user's manual for more detail on the way costs are allocated.[2]

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[2] "User's Manual—Livestock Budget Generator," Firm Enterprise Data System (FEDS), Economic Research Service, U.S. Department of Agriculture, July 1975.

Machinery and equipment power costs are based on specific machinery and equipment complements. These costs are obtained by multiplying the hours each item is operated by the power consumption rate per hour and the appropriate fuel price. Fuel and electricity consumption rates per hour for operating various energy sources are stored in FEDS by State for the years studied.

Purchased cattle are depreciated to their salvage value in 4 years. No depreciation is taken on raised cattle, since the costs of raising the replacement heifers are included in the costs. Actual prices reported by the USDA are used for cull cows and calves sold for beef. Dairy replacements sold are priced in a similar manner. The price series published for dairy replacements also serves for valuing purchased dairy replacements.

MANAGEMENT

The 1973 Agriculture and Consumer Protection Act specified that a "return for management comparable to the normal management fees charged by other comparable industries" be charged. The management charge in prior reports (based on 7 percent of total costs) was thought to be consistent with the intent of the act. The 1981 farm bill provided flexibility in choosing the appropriate allocation for management. There are many ways in which the management charge can be obtained, but no theoretical guide exists, since management is usually rewarded residually by profit as is done in this report. Furthermore, management is not commonly separated from farm operator labor, and there are no standard fee schedules upon which to base this charge.

LAND

Land allocation costs per cow are minor in the dairy FEDS budgets because the dairy budgets include only the land base needed for the dairy farmstead. The FEDS crop budgets, however, include a cost for cropland which is included in the forage costs. For example, the California alfalfa hay budget for 1979 had a land cost of 13 percent of total cost per ton. This is typical of land charges included indirectly in the FEDS dairy budget costs. The land charge in the crop budgets was based on a cash rent charge.

APPENDIX TABLES

APPENDIX TABLE 1.—MILK PRODUCTION PER COW AND POUNDS OF GRAIN FED PER 100 LB OF MILK

[In pounds]

Region	Milk production per cow [1]			Grain concentrates fed per hundredweight of milk [2]		
	1979	1980	1981	1979	1980	1981
Northeast	13,306	13,631	13,972	41	40	39
Upper Midwest	12,355	12,651	12,957	44	43	41
Corn Belt	12,104	12,602	12,877	49	48	46
Appalachia	12,613	13,110	13,382	50	51	49
Southern Plains	12,539	13,170	13,170	59	60	58
Pacific	14,870	15,543	15,913	47	49	47
All regions	12,907	13,312	13,617	45	45	43

[1] 1979 production per cow is based on surveyed farm data. The 1980 and 1981 production levels were obtained by using the relative year-to-year changes reported in Crop Reporting Board publications.
[2] Feeding rates are based on data published in "Milk Production" reports by the Crop Reporting Board.

APPENDIX TABLE 2.—DAIRY COW AND SLAUGHTER COW PRICES, 1970–81

[In dollars per head]

Year	Dairy cow prices [1]	Slaughter cow prices [2]	Difference between prices of dairy cows and slaughter cows
1970	322	256	76
1971	358	259	99
1972	397	303	94
1973	496	394	102
1974	500	307	193
1975	412	253	159
1976	476	304	172
1977	504	304	200
1978	674	441	233
1979	1,044	601	443
1980	1,195	549	646
1981	1,201	504	697

[1] Average price per head received by farmers for milk cows; source is Agricultural Prices.
[2] Price per hundredweight of utility cows at Omaha, Nebr., times an estimated 12 hundredweights per cow; source is Livestock Market News.

APPENDIX TABLE 3.—STATES IN 1980 DAIRY FARM SURVEY, BY REGION, NUMBER OF COWS REPRESENTED, AND CORRESPONDING REGIONS UNDER PRIOR COP REPORTS [1]

State/region	Dairy cows in 1979 [2]	Old region numbers		
		Primary	Secondary	Tertiary
Ohio	373,000	4	5	8
Pennsylvania	701,000	3	5	4, 6
New York	905,000	3	1	2
Vermont	183,000	2	1	------
Connecticut	49,000	2	------	------
Rhode Island	4,000	2	------	------
Massachusetts	48,000	2	------	------
New Hampshire	30,000	2	1	------
Maine	56,000	2	1	------
Northeast	2,349,000	------	------	------
Kentucky	255,000	8	------	------
Tennessee	211,000	8	7	------
Virginia	170,000	6	7	------
North Carolina	132,000	------	------	------
Georgia	130,000	9	------	------
Appalachian	898,000	------	------	------
Iowa	372,000	19	11	------
Illinois	231,000	18	19	------
Indiana	197,000	16	8	15
Missouri	265,000	14	------	------
Corn Belt	1,065,000	------	------	------
Minnesota	843,000	21	20	19, 22
Wisconsin	1,813,000	19	20	21
Michigan	397,000	16	17	------
South Dakota	158,000	22	------	------
Upper Midwest	3,211,000	------	------	------
Texas	311,000	13	------	------
Southern Plains	311,000	------	------	------
California	871,000	23	24	------
Washington	197,000	24	------	------
Pacific	1,068,000	------	------	------
All regions	8,902,000	------	------	------

[1] In cost of production reports published through 1980, States were subdivided into regions that crossed State lines. In this report, different regions were created by aggregating data on a State basis. This table shows the closest association of old COP regions to States.

[2] Source: Milk Production, Disposition, Income 1978-80, Da 1-2 (81), Crop Reporting Board, Economics and Statistics Service, U.S. Department of Agriculture, May 1981.

------ = Not applicable.

EARLIER COST OF PRODUCTION REPORTS

Costs of Producing Milk in the United States—1974.—Prepared by the Economic Research Service, U.S. Department of Agriculture. Senate Committee on Agriculture, Nutrition, and Forestry, committee print 72–184, June 1976.

Costs of Producing Milk in the United States—1975 and 1976.—Prepared by the Economic Research Service, U.S. Department of Agriculture. Senate Committee on Agriculture, Nutrition, and Forestry, committee print 83–252, February 1977.

Costs of Producing Milk in the United States—Final 1976, Estimated 1977, and Projections for 1978.—Prepared by the Economic Research Service, U.S. Department of Agriculture. Senate Committee on Agriculture, Nutrition, and Forestry, committee print 25–504, April 1978.

Costs of Producing Milk in the United States—Final 1977, Preliminary 1978, and Projections for 1979.—Prepared by the Economics, Statistics, and Cooperatives Service, U.S. Department of Agriculture. Senate Committee on Agriculture, Nutrition, and Forestry, committee print 48–946, August 1979.

Costs of Producing Milk in the United States—Final 1978, Preliminary 1979, and Projections for 1980.—Prepared by the Economics, Statistics, and Cooperatives Service, U.S. Department of Agriculture. Senate Committee on Agriculture, Nutrition, and Forestry, committee print 63–760, July 1980.

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